REMARKS

Interview

Applicants' undersigned representative thanks Examiner Smith and his Supervisor, Michael Kornakov, for the courtesies extended during the interview of March 13, 2008. During the interview, the teaching of the present application and the references of record were discussed, including the rejections over the Bruno article, U.S. Patent No. 6,379,575 ("Yin") and U.S. Patent No. 5,926,743 ("Xi"). Regarding the rejections based on these references, Applicants' representative argued that none of the references teach calculating the volume of the cleaning gas, as recited in claim 1. The references also fail to teach scheduling a chamber maintenance procedure. Regarding dependant claim 6, the meaning of "maintenance" as disclosed in the specification was discussed. The Examiner argued that maintenance can include merely cleaning, and is therefore taught. The Examiner agreed that, pending a further review of the references, the arguments presented may be persuasive. The Examiner did not commit to allowing the claims at the interview, but indicated that he would need to further consider the references before a final decision is made.

Restriction Requirement

Applicants affirm the provisional election, made without traverse, of Group I, claims 1-6, 13-18 and 20.

Rejections Under 35 U.S.C. § 103

The Examiner has rejected claims 1-6, 13-18 and 20 under 35 U.S.C. 103(a) as being unpatentable over the article entitled "Study of the NF3 plasma cleaning of reactors for amorphous silicon deposition," ("Bruno article") in view of U.S. Patent No.

6,379,575 ("Yin") and further in view of U.S. Patent No. 5,926,743 ("Xi"), for the reasons provided at pages 5 to 9 of the outstanding Office Action. Applicants respectfully traverse the rejection.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). See M.P.E.P. § 2143.

Claims 1 recites, among other things, a method for maintaining a reactor chamber of a chemical vapor deposition system, comprising: repeating the following until a volume of cleaning gas used during one or more plasma clean cycles has reached a predetermined volume: depositing one or more layers outwardly from an inner surface of a reactor chamber of a chemical vapor deposition system, the one or more layers forming an accumulation layer; establishing that the accumulation layer has reached a specified thickness; performing a plasma clean cycle by introducing the cleaning gas into the reactor chamber; and calculating the volume of the cleaning gas used during the one or more plasma clean cycles, the volume of the cleaning gas indicating the volume of cleaning gas introduced into the reactor chamber; and

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providing a notification that the volume of the cleaning gas used during the one or more plasma clean cycles has reached the predetermined volume.

Bruno discloses a study of NF3 plasma cleaning of reactors for amorphous silicon deposition. As part of the study, Bruno teaches that "after 6-8 deposition runs, giving about 4 microns thick film on the chamber walls and electrodes, a cleaning process with NF3 gas is performed." Bruno, page 691. However, as admitted by the Examiner, Bruno fails to teach calculating the volume of the cleaning gas used during the one or more plasma clean cycles, the volume of the cleaning gas indicating the volume of cleaning gas introduced into the reactor chamber; and providing a notification that the volume of the cleaning gas used during the one or more plasma clean cycles has reached the predetermined volume.

To provide the missing teachings, the Examiner relies upon the Yin and Xi references. Yin does teach employing a cleaning gas to clean an etching chamber. Yin, column 12, line 51 to column 13, line 20. The cleaning can be performed while transporting the substrate out of the chamber or immediately after the substrate is removed from the etching chamber. Column 15, lines 7-12. However, Yin does not teach or suggest calculating the volume of the cleaning gas used or providing a notification that the volume of the cleaning gas used during the one or more plasma clean cycles has reached the predetermined volume.

Xi is directed to avoiding the problem of overetching of the reactor surfaces during plasma cleaning. Xi recognizes that deposits occur unevenly over the reactor surfaces, the heaviest depositions occurring in the hottest areas of the chamber. Thus, Xi's main focus is teaching techniques for avoiding the overetching of chamber

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components with light deposits during cleaning. Column 2, lines 34-48. By heating the areas of the chamber with the heaviest deposits to the highest temperature while cooling areas with lighter deposits, the chamber can be cleaned quickly, and with less overetching. Another technique for avoiding overetching includes blanketing areas of the chamber that are delicate or have less deposits with a non-reactive gas during a portion of the cleaning process. Xi, column 2, Summary.

The Examiner points out that Xi teaches a system controller for controlling all of the activities of the CVD machine. A process gas control subroutine has program code for controlling process gas composition and flow rates. Column 8, lines 13-14. The processes to be executed in the chamber can be scheduled by subroutines. Column 7, line 49-51. Further, a determination is made by the controller as to whether a clean step should be performed. Specifically, Xi teaches that "[t]he clean step is performed after every n substrates are processed." Column 10, lines 31-36.

However, Xi fails to teach or suggest calculating the volume of the cleaning gas used or providing a notification that the volume of the cleaning gas used during the one or more plasma clean cycles has reached the predetermined volume. The teaching by Xi of controlling process gas flow rates is not the same as calculating the volume of cleaning as used. Instead, Xi merely teaches that "the process gas control subroutine ... ramps up/down the mass flow controllers to obtain the desired gas flow rate." Xi, column 8, lines 15-31. Thus, Xi merely teaches manipulating flow rates through the reactor. There is simply no mention of calculating volume of the cleaning gas, or any other gas, from the flow rates.

Further, no mention is made of "providing a notification that the volume of the cleaning gas used during the one or more plasma clean cycles has reached the predetermined volume, as specifically recited in the claims. It stands to reason that if volume of the cleaning gas is not mentioned, as is the case with Xi, that providing a notification that the volume of the cleaning gas used has reached the predetermined volume also cannot be taught.

Thus, the Bruno, Yin and Xi references fail to teach every limitation of the claims. Because every element of the claims is not taught or suggested no *prima facie* case of obviousness has been established, and the rejection should be withdrawn.

Similar arguments apply to claims 13 and 20. Claim 13 is directed to a software for maintaining a reactor operable to, among other things, calculate the volume of the cleaning gas used during the one or more plasma clean cycles, the volume of the cleaning gas indicating the volume of cleaning gas introduced into the reactor chamber; and provide a notification that the volume of the cleaning gas used during the one or more plasma clean cycles has reached the predetermined volume. Claim 20 includes limitations similar to those of claim 1. Accordingly, the reasons discussed above as to why no *prima facie* case of obviousness exists for claim 1 also apply to claims 13 and 20.

Claims 6, 18 and 20 have been amended to recite that the maintenance procedure comprises "replacing a part of the reaction chamber". Because none of the references teach or suggest scheduling a chamber maintenance procedure in response to the notification that the volume of the cleaning gas used during the one or more plasma clean cycles has reached the predetermined volume, the maintenance

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procedure comprising replacing a part of the reaction chamber, claims 6, 18 and 20 are allowable over the prior art of record for this additional reason.

CONCLUSION

In view of the foregoing amendments and remarks, Applicant respectfully requests reconsideration and reexamination of this application and the timely allowance of the pending claims.

If after consideration of this Amendment there are any outstanding issues the Examiner believes could be resolved by a telephonic interview, the Examiner is invited to call Applicants' undersigned representative at 703-917-0000, ext. 103, in order to expedite resolution of the issues and allowance of the application.

Please grant any extensions of time required to enter this response and charge any additional required fees to Texas Instruments' Deposit Account 20-0668.

Respectfully submitted,

Dated: March 14, 2008   By:_____

Matthew L. Whipple
Reg. No. 47,217

Timothy M. Hsieh
Reg. No. 42,672

MH2 Technology Law Group, LLP
703.917.0000